

**Process for producing a building material and binder having increased water resistance****Publication number:** DE3743467**Publication date:** 1989-07-13**Inventor:** KASSAUTZKI MICHAEL (DE)**Applicant:** HEIDELBERGER ZEMENT AG (DE)**Classification:****- International:** **C04B28/16; C04B28/00;** (IPC1-7): C04B11/26;  
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C04B28/14**- European:** C04B28/16**Application number:** DE19873743467 19871222**Priority number(s):** DE19873743467 19871222[Report a data error here](#)**Abstract of DE3743467**

The invention relates to a process for producing a building material and binder having increased water resistance based on natural and/or synthetic anhydrite having a high milled fineness, an activator, a very finely milled filler and additives giving the water resistance, which binder or building material has a fineness by the Blaine method of at least 2500 cm<sup>2</sup>/g, which is characterised in that the additive used is commercial quicklime (burnt lime) and/or slaked lime. The additive is preferably mixed in. Preferably, a high-alumina cement in an amount of at least 2% by weight, based on the total weight, is preferably added as further additional additive. The synthetic anhydrite used is preferably one which is obtained as byproduct in the chemical industry. Furthermore, the finely milled filler can be a marl having an alumina content of at least 4% by weight. The further filler material used can be fly ash and/or very finely milled granulated blast furnace slag.

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The invention relates to a method to the production of a building material and a bonding agent with increased water resistance on the basis of natural and/or artificial anhydrite with high Mahlfeinheit, an activator, a high-fine milled filler and the water resistance causative additions, which bonding agent and/or. Building material egg fineness of at least 2500 cm < 2> after Blaine exhibits.

A bottom building material are for example plates to understand stones and arbitrary other shaped bodies which become recovered as procedure product of the instant invention, by putting on, in forms pouring and confirm letting the procedure product with or without aggregates with water. Bonding agents in accordance with instant invention are such, which are in particular in the layer to confirm hydraulic or puzzolanisch.

To the next-coming state of the art the subject-matters of the DE-OS are 29 12 148 and the EP-application, publication No. to call 00 61 517.

The DE-OS 29 12 148 describes a method to the production of building materials on gypsum basis for waterproof products bottom addition of inorganic fabrics, with which in a first fuel stage a mixture from tonig silikatisch unsaturated lime connections, thus for example Mergel, with a temperature fired will and in a second process step in the first fuel stage of thermal converted mixtures in a continuous process passage with approximately 60 to 90%, preferably 80%, located below the sinter border, weight at the total mixture constituting amount second fuel stage intimate mixed and fired adapted by gypsum (dihydrate) in one the temperature-moderate respective dihydrate becomes.

Subject-matter of the European application, publication No. 00 61 517 is a method to the production of a waterproof bonding agent by thermal conversion of a mixture from kalziumsulfathaltigem material and lime, clay/tone and silikathaltigen fabrics, with which the mixture contains at least 60% calcium sulfate, fine-milled and an homogenized heat effect is subjected, whose temperature and duration are so adjusted that the crystals of the calcium sulfate become into a structure structure converted, a which at least predominant granular character exhibits w the remaining portions of the mixture a hydrationable product to form.

These methods of the state of the art need a very significant energy expenditure, since a so called 100%iges is burning necessary.

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In contrast to this instant invention the object is the basis to create a method to the production of a building material and a bonding agent of the genus initially specified with which the fuel energy expenditure can become very drastic lowered, i.e. with that only order-of-magnitude-wise so called 5% burning, necessary related to which amount of the starting substances is.

This, instant invention at the basis located technical problem becomes dissolved by the fact that one uses commercial fired lime and/or deleted lime with a method of the genus initially specified as additive.

Prefered masses become all additives (additives) admixed. One can use the deleted lime in particular also in the form of Weisskalkhydrat. After an other preferable embodiment one sets a alumina-rich cement with a dosage of at least 2 Gew as other additional additive. - %, related to the total weight.

The additives according to invention can prefered-measured in an amount of at least 3 Gew. - %, related to the total weight used become. One can use such, which results as byproduct in the chemical industry as artificial anhydrite.

In accordance with an other embodiment one can make artificial anhydrite of gypsum, which results with the desulfurisation of powerplants and which is dewatered by a suitable temperature treatment up to the anhydrite.

As fine-milled filler used one in accordance with an other preferable embodiment a Mergel with an alumina content of

at least 4 Gew. - %. Furthermore one can use as fine-milled filler also fly ash from powerplants with Steinkohlenfeuerung. Finally one can begin as fine-milled filler brown coal fly ash. Finally one can use a high-fine-milled granulated blastfurnace slag as fine-milled filler also.

Anhydrite in fine-milled state with water put on, possesses the ability to be converted bottom uptake of the water into dihydrate; the gypsum Kristallinat resultant thereby is responsible for the properties of the resultant structure. For this conversion it requires as well known Anreger, e.g. of potassium sulfate (so called sulfatische excitation) or of hydrated lime (so called alkaline excitation) to consist can.

Gypsum, is it natural fiber gypsum or such, which results with the desulfurisation of coal-fired power stations, becomes usually with temperatures over 350 DEG C partial or complete in anhydrite transferred. Remnants can be contained by hemihydrate or anhydrite A III, which serves the anhydrite as activators. This no more is the case, e.g. because high heated became, then an activator added must from the outside become, either in the form of hemihydrate or as alkali sulfate, preferred potassium sulfate.

With water offset, develops for gypsum, which is responsible for the strength of the confirming mixture from this anhydrite again. This confirmed gypsum mass is not usually stable opposite water, i.e. into contact with water it comes to a successive resolution of the structure by in solution going of the gypsum. The water must be thereby not necessarily a flowing stream; already the condensation of air humidity or the moisture moving within a brick-work can be sufficient, in order to cause such solution damage.

There are of course methods, which are able to produce a water-stable product from common fired Mergel and gypsum. These products have however the disadvantage that the quality in dependence of the production conditions can strew strong and in addition tonhaltige rock must become the common fired with the gypsum, which expensive is expensive and.

The instant invention is the basis the surprising finding that by the use of a suitable unfired filler in compound with certain chemical additions a damage of the confirmed structure can be prevented by a in solution going of the gypsum. In addition it comes that in advanced manner becomes saved opposite the state of the art a substantial portion at heat energy.

When such filler is suitable preferred mergeliger limestone, Kalkmergel or Mergel with a content at alumina of at least 4% cm<, on a fineness of at least 3000; 2> /g after Blaine milled became. In addition, fly ash, which results with the electric dedusting of hard coal or brown coal powerplants, is suitable due to their high fineness for a such use. Without an other Aufmahlung can be perhaps done with these fabrics.

Furthermore also granulated blastfurnace slag used can become, the before dried and on a fineness of more than 3000 cm< in place of the Mergels or the fly ash; 2> /g milled is.

As chemical addition to the improvement of the water resistance a soft fired lime in excellent manner, which is in the trade the bottom designation quicklime available, is suitable. In a dosage the state an improvement of the structure deleted of more than 3% related to the dry anhydrite Mergel mixture, effected this in, which works against a in solution going of the Gipses.

In place of the quicklime, which is abgelöscht when putting on the mixture to hydrated lime, also the Weisskalkhydrat already deleted can be taken.

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Furthermore it was found that can become achieved by an addition of more than 2% of a commercial alumina-rich cement an other improvement of the water resistance.

The nature of instant invention becomes further explained on the basis the subsequent embodiment, which represents a preferable embodiment:

#### Embodiment

The production of the waterproof bonding agent 660 kg anhydrite, or such, become either more natural from the chemical industry come or such milled common mixed after preceding dewatering with 290 kg of Mergel, 40 kg fired lime and 10 kg potassium sulfate from the fluegas desulphuration, and.

One can grind and afterwards with one another mix these constituents also separate.

This 1000 kg material mixture 40 kg (=4%) become Portland cement PZ 35 F admixed.

In this way generated bonding agent is put on with 350 kg water (=35% related to the bonding agent) to a mortar and into arbitrary forms poured and as usual densified.

After a day can be released from form.

The shaped bodies are at least still approx. 28 days with room temperature store. Afterwards a waterproof structure developed has itself.

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**Process for producing a building material and binder having increased water resistance**

Claims of DE3743467

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1. Verfahren zur Herstellung eines Baustoffs und Bindemittels mit erhöhter Wasserbeständigkeit auf der Basis von natürlichem und/oder künstlichem Anhydrit mit hoher Mahlfineinheit, einem Anreger, einem hochfein gemahlene Füller und die Wasserbeständigkeit bewirkenden Zusätzen, welches Bindemittel bzw. Baustoff eine Feinheit von mindestens 2500 cm<sup>2</sup>/g nach Blaine aufweist, dadurch gekennzeichnet, dass man als Zusatzstoff handelsüblichen gebrannten Kalk und/oder gelöschten Kalk einsetzt.
2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, dass man den Zusatzstoff zumischt.
3. Verfahren nach Anspruch 1-2, dadurch gekennzeichnet, dass man den gelöschten Kalk in Form von Weiskalkhydrat einsetzt.
4. Verfahren nach Anspruch 1 bis 3, dadurch gekennzeichnet, dass man als weiteres, zusätzliches Additiv einen tonerdereichen Zement mit einer Dosierung von mindestens 2 Gew.-%, bezogen auf das Gesamtgewicht, einsetzt.
5. Verfahren nach Anspruch 1 bis 4, dadurch gekennzeichnet, dass man die erfindungsgemässen Zusatzstoffe in einer Menge von zumindest 3 Gew.-%, bezogen auf das Gesamtgewicht einsetzt.
6. Verfahren nach Anspruch 1 bis 5, dadurch gekennzeichnet, dass man als künstlichen Anhydrit einen solchen einsetzt, der als Nebenprodukt in der chemischen Industrie anfällt.
7. Verfahren nach Anspruch 1 bis 5, dadurch gekennzeichnet, dass man als künstlichen Anhydrit einen solchen einsetzt, der bei der Entschwefelung von Kraftwerk-Gips anfällt und der durch eine geeignete Temperaturbehandlung bis zum Anhydrit entwässert ist.
8. Verfahren nach Anspruch 1 bis 7, dadurch gekennzeichnet, dass man als feingemahlene Füller einen Mergel mit einem Tonerdegehalt von zumindest 4 Gew.-% einsetzt.
9. Verfahren nach Anspruch 1 bis 7, dadurch gekennzeichnet, dass man als feingemahlene Füller Flugasche aus Kraftwerken mit Steinkohlenfeuerung einsetzt.
10. Verfahren nach Anspruch 1 bis 7, dadurch gekennzeichnet, dass man als feingemahlene Füller Braunkohlen- Flugasche einsetzt.
11. Verfahren nach Anspruch 1 bis 7, dadurch gekennzeichnet, dass man als feingemahlene Füller eine hochfein gemahlene, granuliert Hochofenschlacke verwendet.

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